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(54) APPARATUS FOR WRAPPING COMPRESSIBLE ARTICLES

- (71) I, POUL SUHR, a Danish subject, of Kirkebakken 17, DK-2600 Glostrup, Denmark, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- This invention relates to an apparatus for wrapping compressible articles in sheet material, said apparatus being of the type comprising a feeding mechanism for advancing the articles in a path substantially at right angles to the sheet material and for pushing the articles into a holding mechanism in such a manner that the goods, upon having been transferred to the holding mechanism, are surrounded by a U-shaped loop of the sheet material on their leading upper and under sides the apparatus further comprising means for uniting the legs of the U behind the articles.
- Such an apparatus is known from the Swedish patent specification No. 323,325. This known apparatus is provided with a pair of clamping jaws, which are mounted at the bottom of the apparatus ahead of the holding mechanism, the jaws serving to hold the end of a single strip of sheet material which is placed above the holding mechanism. When the articles are pushed into the holding mechanism they will push the sheet material ahead of them, while at the same time the sheet material slips along the surfaces of the articles whereby the U-shaped loop of sheet material is formed. The holding mechanism serves at the same time to compress the articles transversely of their path of movement. After the articles have been transferred to the holding mechanism in the manner described, an adhesive is applied to the end of the strip of sheet material and the said end is applied to the rearward surface of the articles. The strip of sheet material is served in such a manner that a sufficient length of sheet material is available for sweeping down along the rear surface of the articles, whereby the two ends of the loop are united. This apparatus can only compress the articles to a very limited extent, because no compression is effected before the articles are pushed into the holding mechanism and during the latter operation the sheet material has to slip relative to the articles, whereby a strong compression in the holding mechanism is rendered difficult. Another drawback of the known apparatus is that the end of the strip of sheet material is to be introduced into the clamping jaws after each wrapping operation.
- According to the invention there is provided an apparatus for wrapping compressible material articles in sheet material, comprising two conveyor belts disposed on opposite sides of a path of articles and having runs which face one another and which converge in their feeding direction, means for supplying wrapping sheet material from two opposite sides of the path of articles to a position beyond the output ends of the conveyor belts, heat-sealing and severing means provided between the output ends of the conveyor belts and a holding mechanism, the heat-sealing and severing means comprising two heat-sealing jaws disposed respectively on the said two opposite sides of the path, the said jaws being movable relative to one another transversely of the path of articles. When using the apparatus according to the invention, the ends of the wrapping material supplied from two sides are first sealed together by means of the heat sealing jaws, thereby producing a continuous strip of material extending approximately at right angles to the travel of the articles are pushed into the holding mechanism the article will push the strip of material ahead of it while wrapping material is at the same time supplied from both sides, whereby the compression of the articles produced by the converging conveyor belts is maintained without any slipping of the wrapping material along the surfaces of the articles, and by the subsequent heat sealing of the

5 wrapping material behind the articles a continuous strip of material is again formed for engagement by the front end of the article subsequently arriving from the converging conveyor belts, thereby avoiding complicated gripping and guiding means for bringing the strip of material into working position after a wrapping operation has been completed.

10 Two additional heat sealing devices may be arranged along opposite sides of the holding mechanism. By additionally heat sealing the wrapping material along the sides of the package the wrapping will form an air tight enclosure, whereby the compressed article in its attempt to expand will produce a vacuum in the interior of the wrapping, whereby the latter will be capable of maintaining the articles compressed even if it consists of a relatively thin material.

20 Two guide plates may be provided between the output ends of the converging conveyor belts and the heat sealing jaws, the distance between the two guide plates being slightly greater than the minimum distance between the converging conveyor belts, the means for supplying wrapping sheet material being arranged to supply this material to a downstream of the guide plates in the direction of travel of the articles. It has been found that the effect of these guide plates in combination with the pushing of the articles into the wrapping material will serve to maintain the leading end of the articles so efficiently compressed that they do not expand before being engaged by the holding mechanism.

35 To facilitate the starting up of the apparatus with a fresh supply of wrapping material, the holding mechanism may be mounted on a carriage which is movable towards and away from the converging conveyor belts, and the heat sealing means provided between the converging conveyor belts and the holding mechanism may be mounted in a frame which is movable in the same directions.

45 The invention will now be explained in further detail with reference to the accompanying drawings, in which:—

50 Figures 1A and 1B diagrammatically show an apparatus according to one embodiment of the invention, in side view;

Figure 2 a detail of Figure 1 to illustrate the transfer of a compressed article from one set of conveyor belts to another;

55 Figure 3 is a section along the line III-III in Figure 1;

Figure 4 a section corresponding to Figure 3, but illustrating another embodiment of the invention;

60 Figure 5 on a larger scale, a portion of the apparatus shown in Figure 1 with the addition of guide plates; and

65 Figure 6 a diagrammatic view of a further embodiment of the invention, particularly

for illustrating the manner of supporting the various parts of the apparatus.

In the drawings, 1 is a feeding conveyor in the form of an endless conveyor belt which runs across a reversing roller 2 at the input end of the apparatus. The apparatus comprises a feeding mechanism consisting of two endless conveyor belts 3 and 4 which have runs 5, 6 facing each other and converging in the feeding direction. Along the sides of these runs facing away from one another supporting plates 7 and 8 are provided. At the input end the two converging conveyor belts 3 and 4 run across two reversing rollers 9 and 10 and at the output end a somewhat different reversing arrangement is arranged consisting of three rollers 11, 12, 13 and 14, 15, 16 respectively for each belt. The roller 12 is coupled to a driving motor 18 by means of a pulley 17. The arrangement comprising three rollers at the output end of the conveyor belts 3 and 4 permits of the use of two small rollers 11 and 14 at the output end, and at the same time it is possible to use one of the rollers as a tightening roller. Beyond the output ends of the converging conveyor belts a heat sealing device is provided comprising two jaws 20 and 21, one of which 21 is movable by means of a cylinder or solenoid device 22. The two jaws 20 and 21 are mutually parallel and may thus be moved towards and away from one another. The jaws extend transversely of the feeding direction of the two converging conveyor belts 3 and 4 and are constructed in known manner to sever the seam produced by them so as to form two distinct seams.

After the heat sealing station follows a holding mechanism in the form of two holding conveyor belts 24 and 25 having parallel runs 26 and 27 facing one another, supporting plates 28 and 29 being arranged on the sides of the runs facing away from one another. At the input end of the holding conveyor belts 24, 25, these are guided and driven in exactly the same manner as the converging conveyor belts 3, 4 are guided and driven at their output end, and this arrangement will therefore not be described in detail.

Along each side of the holding conveyor belts 24 and 25 there is provided a heat sealing device similar to the heat sealing device 20, 21, 22, but extending in the longitudinal direction of the holding conveyor belts. The construction and arrangement of these lateral heat sealing devices is seen most clearly in figure 3, where the lower heat sealing jaws are denoted by 32 and 33 respectively, the upper movable heat sealing jaws by 34 and 35 respectively, and actuating mechanisms belonging thereto by 36 and 37 respectively. Instead of these lateral heat sealing devices, an arrangement 130

for the blowing of hot air may be used such as illustrated in figure 4, this arrangement comprising two distributing boxes 39 and 40 for blowing hot air onto the portions of the wrapping material extending laterally from the article.

The apparatus further comprises two roller supports 42 and 43 for rolls of heat sealable wrapping material 44 and 45 respectively, from which sheet material is supplied across suitable guiding and tightening rollers 46 and 47 laterally to a zone between the output end of the converging conveyors 3 and 4 and the heat sealing device 20, 21, 22.

The apparatus shown in figure 1 operates as follows:

First the apparatus is prepared for start-up by heat sealing the ends of the strips of material from the two rollers 44 and 45 together by means of the heat sealing device 20, 21, 22 so that a continuous strip is formed which extends substantially at right angles to the feeding direction of the article through the apparatus between the heat sealing device 20, 21, 22 and the output end of the conveyors 3 and 4. The article or articles 50 to be wrapped, e.g., articles of synthetic resins, pillows, eider-downs, blankets, stacks or magazines, or other compressible articles, are supplied to the conveyor belt 1 and is fed by the latter into the gap between the converging conveyor belts 3 and 4. On its travel between the conveyors 3 and 4 an article will be compressed and when the article is transferred to the holding mechanism 24, 25 the compressed article will push the strip of wrapping material ahead of it to form a loop. When the article has been received between the conveyor belts 24, 25 of the holding mechanism and its rear end has just passed the input ends of the conveyors, the two legs of the U-shaped wrapping material loop may be heat sealed together by actuation of the heat sealing jaw 21. The sealing seam is then severed into two parts so that the two strips of material remain united and are capable of forming a U-shaped loop around the next article.

The strips of wrapping material has a width such that their marginal portions extend beyond the article compressed between the holding conveyor belts 24 and 25 and these marginal portions may now be heat sealed together by means of the heat sealing devices 32 and 36 as illustrated in figure 3. The heat sealing of the marginal portions may also be performed by means of the arrangement illustrated in figure 4. It will be understood that during the travel of the article through the apparatus, the movements of the two sets of conveyor belts and the heat sealing devices are so controlled that the operations are performed in a

suitably timed manner. Thus, the holding belt conveyors are stopped when an article or batch of articles has just reached the position where the strips of material are to be heat sealed together by means of the heat sealing device 22, 24 and thereafter the apparatus is again started until the article or batch has reached the lateral heat sealing devices. Concurrently with these steps new articles or batches will successively be advanced between the two converging conveyor belts 3 and 4.

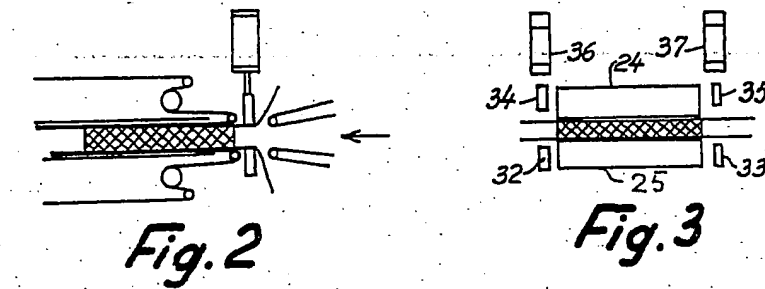
The loop of wrapping material formed around the leading end of the compressed article will to some extent prevent the article from expanding on its way from the converging conveyor belts 3 and 4 to the holding conveyor belts 24 and 25. For additionally preventing such expansion the apparatus may as illustrated in figure 5 be provided with two guide plates 51, 52, which are mounted immediately in front of the ultimate reversing rollers 13 and 14 of the converging conveyor belts 3 and 4. These guide plates, which may be connected with one another by means of plates at their ends so as to form a nozzle, will maintain the end of the article under compression and will thereby delay expansion of the article so that the article may reach the holding conveyor belts 24 and 25 before a too great expansion has taken place. In this connection it is mentioned that the apparatus may work at a very high speed which as far as the converging conveyor belts are concerned may be of the order of 24 to 25 m per minute.

Since the guide plate arrangement 51, 52 may give rise to difficulty in feeding the apparatus with a fresh supply of wrapping material, the holding conveyor belts 24 and 25 may be mounted on a carriage 53, such as diagrammatically illustrated in figure 6. The carriage is supported on rails 54 and can be moved by means of a cylinder device 55 in a direction towards and away from the converging conveyor belts 3 and 4 which are diagrammatically shown in this figure. Also the heat sealing device 20, 21, 22 is movably mounted, being suspended in a frame 56 which by means of two bearings 57 is slidably mounted on horizontal guides 58 attached to the frame of the apparatus. By compressing the cylinder device 55, the frames 56 may be pushed away from the output end of the converging conveyor belts 3 and 4 so as to make space available for introducing the ends of the strips of wrapping material, and when this introduction has taken place the cylinder device 55 is again expanded to press the carriage 53 against the frame of the heat sealing device and thereby to push the latter towards the output end of the converging conveyor belts 3 and 4 until it engages an abutment not

- 4 shown which determines the distance to be maintained in order to obtain a correct transfer of the compressed article to the holding conveyor belts as above explained.
- 5 WHAT I CLAIM IS:—
1. An apparatus for wrapping compressible articles in sheet material, comprising two conveyor belts disposed on opposite sides of a path of the articles and having runs which face one another and which converge in their feeding direction, means for supplying wrapping sheet material from two opposite sides of the path of articles to a position beyond the output ends of the conveyor belts, heat-sealing and severing means provided between the output ends of the conveyor belts and a holding mechanism, the heat-sealing and severing means comprising two heat-sealing jaws disposed respectively on the said two opposite sides of the path, the said jaws being movable relative to one another transversely of the path of articles.
- 10 2. An apparatus as claimed in claim 1, including two additional heat-sealing devices arranged along opposite sides of the holding mechanism.
- 15 3. An apparatus as claimed in claim 1, in which two guide plates are provided between the output ends of the converging conveyor belts and the heat sealing jaws, the distance between the two guide plates being slightly greater than the minimum distance between the converging conveyor belts, the means for supplying wrapping sheet material being arranged to supply this material to a position following the guide plates in the direction of travel of the articles.
- 20 4. An apparatus as claimed in claim 1, in which the holding mechanism is mounted on a carriage which is movable towards and away from the converging conveyor belts, and the heat-sealing means provided between the converging conveyor belts and the holding mechanism is mounted in a frame which is movable in the same direction.
- 25 5. An apparatus for wrapping compressible articles as hereinbefore described with reference to the accompanying drawings.
- 30 35 40 45 50

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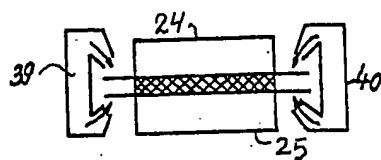


Fig. 4

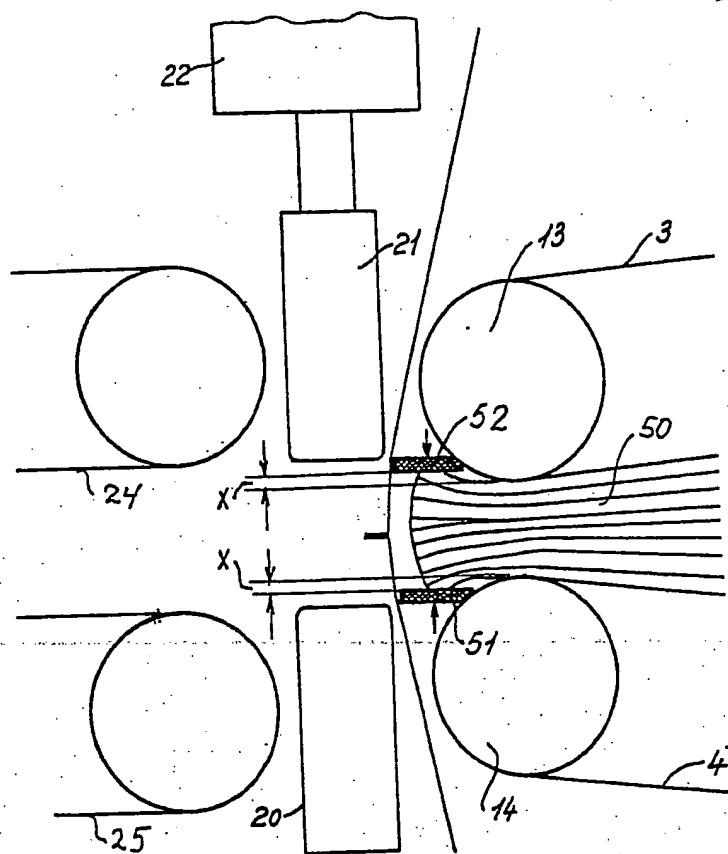


Fig. 5

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3 SHEETS

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the Original on a reduced scale

Sheet 3

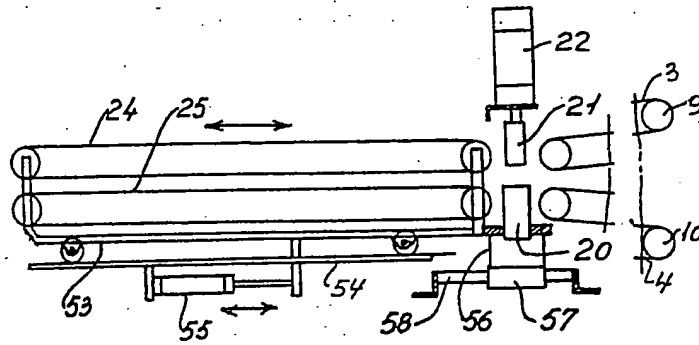


Fig. 6